REMARKS

Claims 1-9 and 11-25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hayden et al (U.S. Patent No. 4,007,135 (hereinafter "the '135 reference")). This rejection is respectfully traversed. Applicants adhere to the remarks/arguments made in the prior Amendment, dated June 9, 2005 and the prior Response, dated November 10, 2005, and those remarks/arguments are hereby incorporated by reference. The following paragraphs are intended to further elaborate on the remarks/arguments already given.

Applicants claimed method in the present application relates to a supported highly selective epoxidation catalyst comprising silver in a quantity of at most 0.17 g per m^2 surface area of the support and further comprising one or more selectivity enhancing dopants selected from rhenium, molybdenum and tungsten. The catalyst, or a precursor of the catalyst containing silver in cationic form, is contacted with a feed comprising oxygen at a catalyst temperature above 250 °C for a duration of at least 0.5 hours and up to 150 hours, and subsequently the catalyst temperature is decreased to a value of at most 250 °C.

As explained in the application text (page 7, line 28 – page 8, line 13), the present invention may specifically be applicable to epoxidation catalysts having a selectivity enhancing dopant (as defined) and having a relatively low silver density. Catalysts having a higher silver density are preferably not subjected to the treatment of the present invention (cf. application text, page 4, lines 3-8). It has been found that the selectivity of a highly selective epoxidation catalyst can be improved by heat-treating the catalyst in the presence of oxygen at a temperature which is typically above the catalyst's normal initial operation temperature (cf. application text, page 3, lines 19-23).

In the second paragraph on page four of the Office Action, mailed February 3, 2006, the Examiner reiterates:

> "Hayden et al. do not specifically disclose a method for improving the selectivity of a...catalyst", as recited in the instant claims. However, because Hayden et al. disclose the same or similar method steps, conditions, and catalyst components as respectively claimed, it would have been obvious to one skilled in the art at the time the invention was made to reasonably expect that the method of Hayden et al. would result in improved catalyst selectivity, in view of the strong similarities between Hayden et al. and the claimed invention."

In the fifth paragraph on page five of the Office Action, mailed February 3, 2006, the Examiner further elaborates on the reasoning behind the rejection of the claims:

> "The rejection of record is not based on inherency, but on the basis of reasonable expectation. One skilled in the art would reasonably look at two methods, each of which have different intentions, yet have the same or similar steps, and expect that same intentions, absent the showing of convincing evidence to the contrary, would be envisioned by both methods.
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> 'Similar processes can reasonably be expected to yield products which...have the same properties.' In re Spada, 15 U.S.P.Q.2d 1655 (Fed. Cir. 1990)."

In the last sentence of the Examiner's reasoning, she quotes from *In re Spada*, 15 U.S.P.Q.2d 1655 (Fed. Cir. 1990); however, upon reviewing the *Spada* decision, it appears that *In re Spada* is not the source of the quoted material. Applicants believe it is important to understand the context in which the quoted material is made in order to fully respond to the Examiner's rejection. Nevertheless, Applicants have still proceeded to set out additional arguments to the Examiner's rejection.

In order to establish a *prima facie* case of obviousness, there must be a reasonable expectation of success for the modification of the prior art. M.P.E.P. 2143 and 2143.02. It appears that the Examiner is applying an improper "obvious to try" rationale in support of the obviousness rejection. M.P.E.P. 2145(X)(B). "Obvious to try" has been defined in terms of

what "would have been to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which parameters were critical or no direction as to which of many possible choices is likely to be successful...." *Id.*

The Examiner relies on Example 7 of the '135 reference for teaching the same or similar method steps, conditions and catalyst components of the claimed invention. In the first paragraph on page 4, the Examiner states:

> "Example 7 of Hayden et al. depicts the preparation of a catalyst comprising alpha-alumina, silver, and barium, wherein the support is impregnated with barium hydroxide, followed by heating in an air atmosphere at 300 °C for 60 minutes, followed by forming a second solution of silver and barium acetates. The final catalyst is passed over with a gas mixture comprising 30 % ethylene, 8 % oxygen, 62 % nitrogen, and 4 ppm ethylene dichloride, during which selectivity and conversion were determined at 240 °C."

It is respectfully noted that the Examiner errs in her description of Example 7. Example 7 of the '135 reference does not disclose heating the barium hydroxide impregnated support in an air atmosphere at 300 °C for 60 minutes. Instead, Example 7 discloses heating the barium hydroxide impregnated support in an atmosphere of air at 300 °C for 30 minutes and then in an atmosphere of carbon dioxide gas at 300 °C for 60 minutes to convert the barium hydroxide to barium carbonate. *U.S. Patent No.* 4,007,135 col. 10, ll. 9-13. The barium-containing support is then impregnated with silver and promoters and heated in a forced draught oven for 4 hours while the temperature is raised from 100 to 280 °C at a rate of 0.8 °C/min. *Id.* at col. 10, ll. 22-26.

When making a proper determination under 35 U.S.C. 103, "the examiner must . . . make a determination whether the claimed invention 'as a whole' would have been obvious

at that time to that person." M.P.E.P. 2142. "[T]he question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. M.P.E.P. 2141.02(I). The Examiner must look at the '135 reference as a whole. The '135 reference, as a whole, does not distinguish between high or low temperatures for decomposing silver to silver metal, high or low silver densities of the catalysts, or the various promoters utilized with the catalysts.

The '135 reference generically discloses decomposing silver by heating to a temperature of 200-400 °C, without expressing a preference to use higher temperatures over lower temperatures or lower temperatures over higher temperatures. *U.S. Patent No.* 4,007,135 col. 5, ll. 17-19. In particular, Example 4 discloses reducing the silver salt in an atmosphere comprising hydrogen at a maximum temperature of 220 °C. *Id.* at col. 9, ll. 15-20. Example 10 discloses reducing the silver by heating in a forced draught oven for 4 hours while the temperature was raised from 100 to 300 °C at a rate of 0.8 °C/min. *Id.* at col. 12, ll. 28-32. Further, the '135 does not generically disclose any relationship between the amount of silver and the surface area of the support, i.e., silver density. Also, the '135 reference focuses on the use of barium as a catalytic component.

Further, a comparison of Example 7 to Example 27 shows that using higher temperatures with catalysts having silver densities greater than claimed in the present invention can lead to a decline in catalyst selectivity. In Example 7, as discussed above, the silver impregnated supports are heated in a forced draught oven for 4 hours while the temperature is raised from 100 to 280 °C at a rate of 0.8 °C/min. The catalysts in Example 7 contained 8 % by weight silver and were prepared using a support having a surface area of 0.17 m^2/g. *Id.* at col. 9, l. 65 – col. 10, l. 2. The silver density can be calculated to be 0.47

grams of silver per m^2 surface area of the support which is greater than claimed in the present invention. None of the catalysts in Example 7 contained rhenium, molybdenum or tungsten as catalytic components. In Example 27, the silver impregnated supports are heated in a forced draught oven for 4 hours while the temperature is raised from 100 to 300 °C at a rate of 0.8 °C/min. *Id.* at col. 21, ll. 36-41. The disclosures in Example 7 and 27 appear to be the same except for the maximum silver reduction temperatures (280 °C vs. 300 °C) and the preparation of the silver solutions. The silver solution in Example 7 contained ethanolamine while it is not mentioned in Example 27. Catalysts J, P, R, and T of Example 7 had the same catalytic components as Catalysts 18', 29', 20', and 21', respectively, of Example 27. In comparing the selectivity data disclosed for these catalysts, one skilled in the art would find at lower conversion levels the effect of heating to higher temperatures is ambiguous at best, while at higher conversion levels, i.e., 40 % oxygen conversion, the effect of higher temperatures significantly reduces the selectivity of the catalyst. For example, the selectivity declined over 5 percent for Catalysts 18' and 29' of Example 27 which were heated to 300 °C as compared to Catalysts J and P of Example 7 which were heated to 280 °C. Thus, Examples 7 and 27 show that when catalysts which do not contain rhenium, molybdenum, or tungsten and have silver densities greater than claimed in the present invention are heated to higher temperatures, the higher temperatures can lead to a decline in selectivity rather than an improvement.

Therefore, it would not have been obvious to one skilled in the art when considering the '135 reference as a whole to reasonably expect that the method of the '135 reference would always result in improved catalyst selectivity unlike the present invention which relates to the discovery that a specific treatment for a certain group of epoxidation catalysts,

as defined by silver density and selected selectivity enhancing dopants, results in a distinct advantage in selectivity.

Care must be taken not "to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." *See Id.* (quoting *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1983)). Bits and pieces of the invention as currently claimed can be pointed to in the prior art, but only if one is armed with hindsight knowledge. The prior art does no more than suggest experimenting with many possible combinations of parameters to come up with the invention as claimed. 'Obvious to try' is not the standard for obviousness.

The '135 reference discloses many different properties with respect to the catalyst and the support. The catalyst preferably comprises 3 to 15 % by weight silver, more preferably 6 to 12 % by weight silver. *U.S. Patent No.* 4,007,135 col. 3, ll. 27-28. There are many possible promoters disclosed in the '135 reference. For example, possible promoters include: copper, gold, zinc, cadmium, mercury, niobium, tantalum, molybdenum, tungsten, vanadium, or preferably chromium, calcium, magnesium, strontium and/or, more preferably barium. *Id.* at col. 1, ll. 35-39. Additional promoters include: alkali metals, especially sodium, potassium or rubidium. *Id.* at col. 3, ll. 13-17. Also, the '135 reference discloses many different properties for the support such as surface area, apparent porosity, median pore diameter, pore size distribution, pore volume, ratio of median pore diameter to average equivalent diameter of the silver particles. *Id.* at col 1, ll. 25-35; col. 3, ll. 28-50. With respect to the surface area, the range disclosed is from 0.04 to 10 m^2/g. *Id.* Further, the '135 reference discloses decomposing silver by heating to a temperature of 200-400 °C. *Id.* at col.

5, ll. 17-20. There are no generic teachings with respect to heating atmospheres or heating times.

The '135 reference does not provide an indication of which parameters are critical or which direction as to the many possible choices is likely to be successful. Specifically, the '135 reference does not teach or suggest any relationship between the amount of silver and the surface area of the support, i.e., silver density. Further, the '135 reference does not teach or suggest any relationship between particular values for the silver density, promoters and heating conditions to indicate which of the many possible combinations of parameters would be successful. In particular, as discussed above, the '135 reference, when considered as a whole, provides no preference to use higher temperatures over lower temperatures and shows higher temperatures can actually lead to a decline in catalyst selectivity.

In view of these arguments, Applicants believe that a *prima facie* case of obviousness has not been established for Claims 1-9 and 11-25.

CONCLUSION

Applicants respectfully request that the Examiner reconsider the present rejection in the light of the arguments presented in these remarks.

The rejection being traversed, allowance of the claims of the present application is respectfully requested. If the Examiner would like to discuss this case with Applicants' attorney, the Examiner is invited to contact Richard Lemuth at the phone number below.

Respectfully submitted,
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